

## Physics (Particle Physics)

# PRECISION MUON CHAMBERS TEST

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In the MDTs (Monitored Drift Tube Chamber), as in any drift chamber, variations of fundamental properties of the gas, such as pressure, temperature and composition, have important effects on the tracking precision<sup>1</sup>. In the beginning, the leak rate of each chamber was calculated. This was done by measuring pressure drops with a given period of time and correlating it with temperature. Temperature sensors and pressure gauge were used extensively. At the end of the experiment the amount of leak rate in *mbar liter per day* was calculated and was compared to the ATLAS (A Toroidal LHC ApparatuS) specification. All on line analysis were done using PAW (a software package developed at CERN for physics analysis).

The second part of the experiment involved measuring the amount of impurities in most chambers. Impurities are largely due to previously measured leaks. It was known already that a small amount of impurities in any chambers alter the drift properties and hence hinders the detection process. The chambers that were studied were as follows: two BIL (Barrel Inside Large), and two BML (Barrel Middle Large), for specification and terminology of these barrels please refer to the ATLAS Muon Spectrometer Technical Design Report.

After the above measurements and analysis, data of high-energy muons were taken. My last job was to measure and to fit one aspect of the tracking efficiency of each chamber. This was done by collecting drift time spectra for all tubes (more than 700 tubes) of all selected chambers and then by calculating the maximum drift time for each tube. Then, distribution of all collected maximum drift time was studied for error analysis.

<sup>1</sup>ATLAS Muon Spectrometer Technical Design Report, CERN/LHCC/97-22 ATLAS TDR 10, 31 May 1997, pp152